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ABSTRACT

Two studies investigated characteristics of verbal elaborations (length and number of relations provided by the syntactic construction) to determine what makes them effective mediators for young children. Study I treated the role of an elaboration's length in facilitating paired associate learning in 22 nursery school children. Data indicated that longer paragraphs (three sentences) might be more effective than shorter paragraphs (two sentences), and that factors other than length might be important as well. Study II demonstrated that when 17 five year old children were given elaborations containing three relations (either sentences or paragraphs), they made fewer errors than those given one-relation sentences. Results indicated that within grammatically appropriate constructions, relational characteristics were more important than either the specific structures studied or physical length of an elaboration in facilitating paired associate performance. Similarities in the performance trends of normal and retarded children across levels of task difficulty were examined. (Author/GW)

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VERBAL ELABORATION PHENOMENA IN NURSERY SCHOOL CHILDREN[1]

James E. Turnure and Martha L. Thurlow
University of Minnesota
Research, Development and Demonstration
Center in Education of Handicapped Children
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Abstract

Two studies were designed to explore the characteristics of verbal elaborations which make them effective mediators for young children. Study I investigated the effect of the length of an elaboration on its efficacy in facilitating paired-associate learning in nursery school children. Although the results indicated that longer paragraphs (3-sentence) might be somewhat more effective than shorter ones (2-sentence), they also suggested that factors other than length might be important as well. Study II demonstrated that when 5-year-old children were given elaborations containing three relations (either sentences or paragraphs), they made fewer errors than those given one-relation sentences. It seemed that within grammatically appropriate constructions, relational characteristics were more important than either the specific structures studied or the physical length of an elaboration in facilitating paired-associate performance. Similarities in the performance trends of normal and retarded children across levels of task difficulty were explored.

Verbal Elaboration Phenomena in Nursery School Children[1]

James E. Turnure and Martha L. Thurlow

Several investigators (Jensen & Rohwer, 1965; Kendler, 1963; Luria, 1961; Reese, 1962) have suggested that children younger than six years of age may be unable to use verbal contexts to mediate associations between two items, i.e., that they manifest a mediator or mediational deficiency (see Milgram, 1971). Verbal learning research, however, has indicated that the poorer performance of young children in tasks which require them to mediate associations between two items does not result from a mediational deficiency, but rather, from a production deficiency (Flavell, 1970). In other words, young children seem to perform poorly on mediational tasks because they are unable to spontaneously produce mediators, not because they are unable to use them.

Verbal elaboration research has provided further support for the notion that young children cannot be generally characterized as mediationally deficient. Although no performance facilitation occurred when five-year-old children were asked to construct their own sentences containing the names of two pictures to be related (Jensen & Rohwer, 1965), nursery school children of the same and younger ages were found to perform nearly perfectly on a paired-associate task when they were given experimenter-constructed elaborations in the form of simple paragraphs (Turnure, Thurlow, & Larsen, 1971, Study III). It thus appears that although they may not be able to produce effective mediators, very young children are capable of utilizing mediators,

comprehending the task, and performing mediational activities when they are provided with appropriate elaborations (cf. Bem, 1970; Jenkins, 1967; Turnure et al., 1971).

It becomes important, therefore, to explore the characteristics of verbal elaborations which make them effective mediators for young children. The investigation of these characteristics should provide: (a) a valuable basis for developing instructional materials and training procedures for young children (both normal and retarded), and (b) some clarification of the theoretical ambiguities concerning the basis of the facilitating effects of verbal elaboration on paired-associate learning (Blumenthal, 1967; Bobrow & Bower, 1969; Ehri & Rohwer, 1969; Turnure, 1971; Turnure & Walsh, 1971). Furthermore, it should provide additional verbal elaboration data with which to survey and compare the performance trends of normal and retarded children.

Two studies were carried out with nursery school children. They were designed to investigate (a) the effect of physically extending the length of the syntactic construction (from a 2-sentence to a 3-sentence paragraph), and (b) the effect of increasing the number of relations a given syntactic construction provides between two items to be associated.

Study I

Verbal elaboration research has demonstrated the remarkable facilitation of learning efficiency which results from presenting paried-associates in syntactic contexts such as phrases and sentences.

Rohwer (1968) noted this effect and hypothesized that the greater the elaboration, the greater would be the resulting learning efficiency. Although Rohwer and his associates have not examined the facilitative effects of elaboration contexts more extensive than the sentence, Turnure (1971; Turnure & Walsh, 1971) found that not only was sentence elaboration more effective in facilitating acquisition than labeling, but also that two-sentence paragraphs were more effective than sentences. If, as Rohwer suggests, increasing amounts of elaboration do result in increased learning efficiency, then the greater the physical length of an elaboration, i.e., the greater the physical amount of verbal context presented, the better learning efficiency should be. Study I was thus designed to investigate the effect of the length of a paragraph elaboration (2 and 3 sentences) on the facilitation of paired-associate learning.

Method

Subjects. Twenty-two children from a private nursery school in St. Paul, Minnesota were employed as subjects in the present study. Subjects were matched in terms of age and then randomly assigned to two treatment groups, with the restriction that each group contain the same number of males and females. Mean ages for the two groups (5 males, 6 females each) were: Group I -- 64.4 months (SD = 1.8); Group II - 64.5 months (SD = 2.0).

Materials. Twenty-four colored pictures of common objects were cut from a preprimer workbook and mounted on white cardboard (8.9 x 6.4 cm). From these pictures, 12 pairs were randomly formed with the

restriction that no obvious or common relations of sound or meaning existed between the members of a pair. For each pair, 2-sentence and 3-sentence paragraphs were constructed. These were formulated so that the stimulus and response terms were equally distributed among the sentence members, and so that the meaning of the 2-sentence and 3-sentence paragraphs would be comparable (e.g., 2-sentence paragraph: "Don't bounce the ball. Put it on the table."; 3-sentence paragraph: "Don't bounce the ball. It might break something. Put it on the table."). In each elaboration presented, the stimulus and response terms occurred only once (see Appendix 1).

Procedure. Two experimental conditions were studied: Group I received 2-sentence paragraphs, and Group II received 3-sentence paragraphs. All subjects were tested individually in the training, acquisition, and reversal phases of the experiment. In the single training trial given before acquisition, the subject was shown pictures of each stimulus and response pair together for 20 seconds. During this interval the experimenter uttered the paragraph relating the pair, and the subject repeated the utterance (pilot testing indicated that 20 seconds would be required to give the Group II subjects time to listen to and repeat the utterances). Following training with all 12 pairs, each subject was given one acquisition trial and one reversal trial. During the acquisition trial, each stimulus picture was shown to the subject and he was required to respond with the name of the corresponding response item. If an incorrect response was given or no response was given within 20 seconds, an error was scored. Following

a response, or 20 seconds, the subject was shown the stimulus picture with its corresponding response picture for five seconds. The number of errors made during this trial was taken as the measure of acquisition performance.

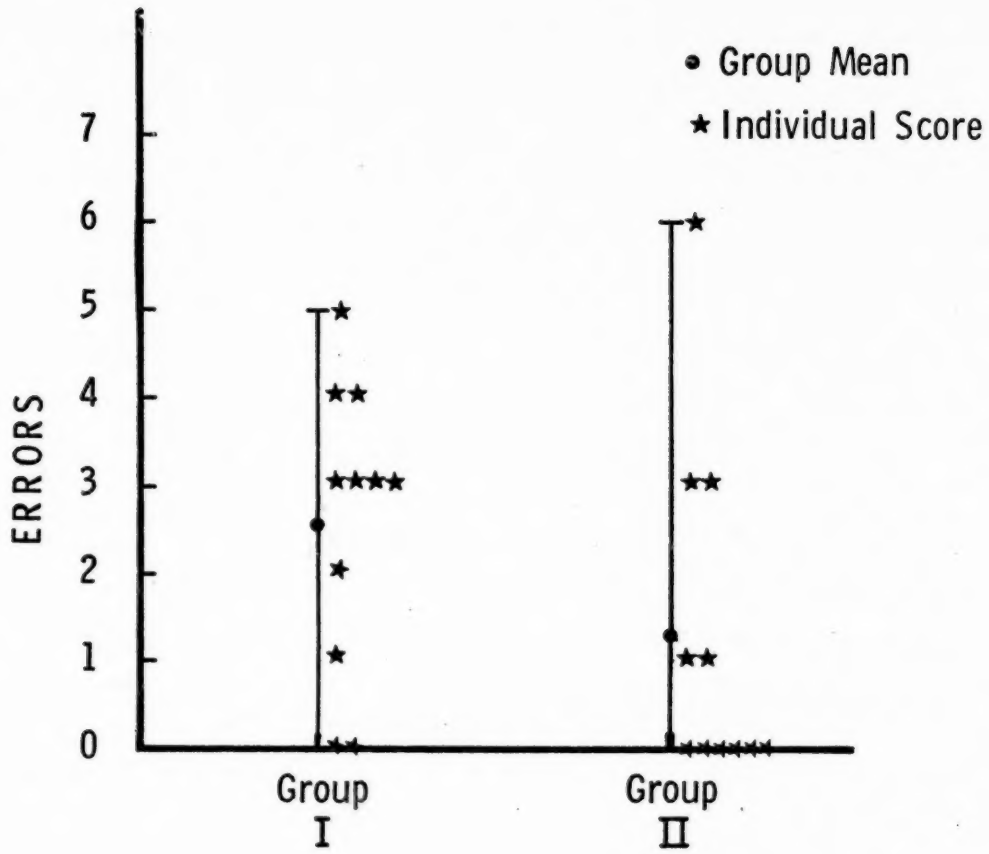
On the reversal trial, the subject was shown a picture which was formerly a response item, and was required to give the name of the corresponding stimulus item. The subject was not told of the change in procedures. The number of errors on this trial was taken as the measure of reversal performance.

Results

The mean number of acquisition errors for Groups I and II were 2.54 (SD=1.63) and 1.27 (SD=1.95), respectively. Both groups performed at levels which were quite high, with subjects in Groups I and II averaging 79 and 90 percent correct responses immediately following training. A two-way analysis of variance (Conditions X Sex) on the number of acquisition errors revealed no significant effects. Although the direction of the results suggested that the longer elaborations were somewhat more effective in facilitating acquisition performance, the difference was not significant ($F=2.58$; $df=1,18$; $p > .10$). Observation of the raw data, however, indicated the presence of a ceiling effect (see Figure 1), which may have prevented the detection of significant differences in the analysis of variance. Assessment of this data revealed that the proportion of subjects performing errorlessly was smaller in Group I (2/11=.182) than in Group II (6/11=.545). A test of the difference between these proportions was significant

Figure 1

Acquisition Errors



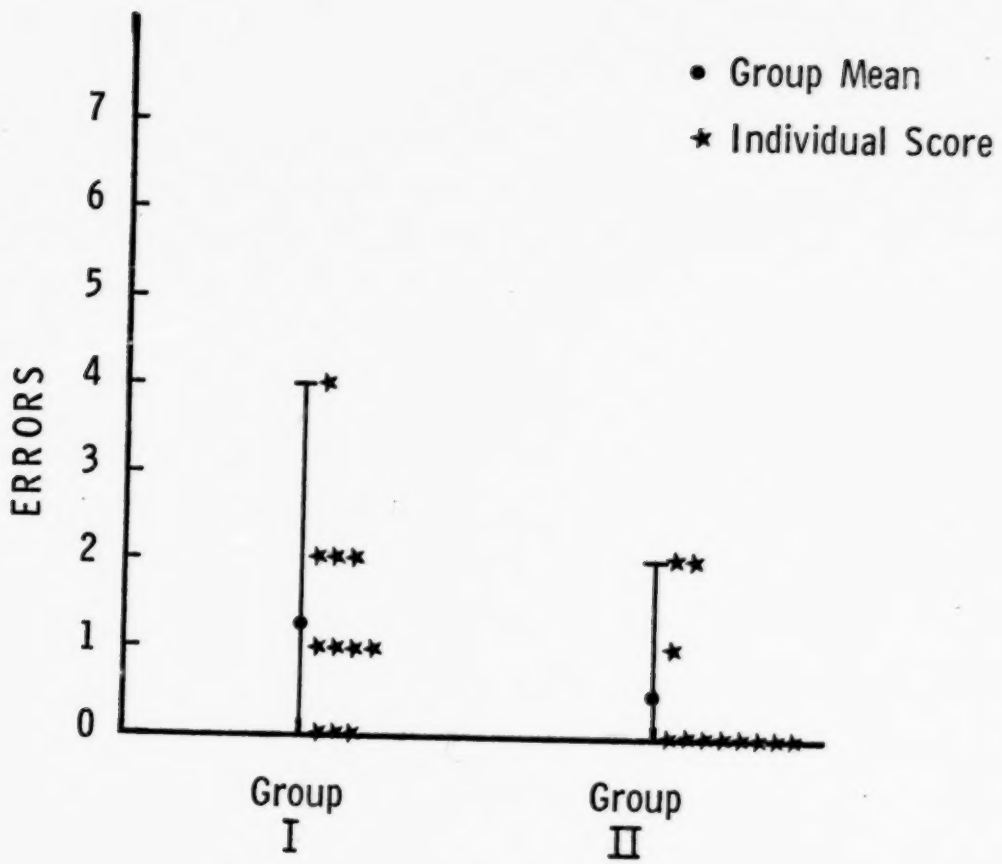
(z=2.71, p <.01), again suggesting that the longer elaborations might be more effective in facilitating performance than the shorter elaborations.

It should also be noted, however, that the superior performance of Group II subjects in overall performance did not hold true for all pairs (see Appendix 1). Subjects receiving the 3-sentence paragraphs showed fewer errors than Group I subjects only on seven of the 12 pairs; on the other five pairs, they made as many or more errors than the subjects receiving 2-sentence paragraphs. Furthermore, the correlation between the number of errors made on the various pairs by the two groups was only .37 (df=10; n.s.). Apparently, the facilitative effects of a given elaboration are not determined solely by its length.

The mean numbers of reversal errors were 1.27 (SD=1.19) and .45 (SD=.82) for Groups I and II, respectively. A two-way analysis of variance revealed that differences between the two groups were not significant (Conditions effect: F=3.64; df=1,18; p <.10). As with acquisition performance, the direction of results suggested a somewhat superior level of performance for Group II subjects. Figure 2, which portrays the distribution of reversal scores in the two groups, again suggests that a ceiling effect may have prevented the detection of differences. The proportions of subjects performing errorlessly in Group II (8/11=.727) was significantly greater than the proportion performing errorlessly in Group I (3/11=.273; z=3.39, p <.001). As in acquisition, performance levels were high for both groups. Subjects trained with 2-sentence paragraphs responded correctly to 90% of the

Figure 2

Reversal Errors



reversal pairs, and subjects trained with 3-sentence paragraphs responded correctly to 96% of the pairs.

Discussion

Results of the present study do not provide conclusive evidence either for or against Rohwer's hypothesis. The finding of differences between the proportions of subjects performing errorlessly in the two groups, given the indication of ceiling effects which may have blocked the detection of differences in the overall analysis of variance, suggests that longer elaborations may in some way facilitate both acquisition and reversal performance. These findings can only be taken as tentative support for Rohwer's hypothesis, however, since the acquisition data also indicated that it was only for certain elaborations that the longer ones were more effective than the shorter ones.

The implication of the latter finding is that something more is involved in the facilitation of performance by extended elaborations than a mere increase in their physical length. Although examination of those pairs in which the 3-sentence paragraphs were more effective than the 2-sentence paragraphs did not reveal any clear differences other than in length, the possible importance of the relationships formed between two items on the facilitation of paired-associate performance has recently received considerable attention (Anderson, 1970; Asch, 1969; Bobrow & Bower, 1969; Ehri & Rohwer, 1969; Turnure, 1971). An initial investigation into the effects of varying the number of relations represented in an elaboration was undertaken in Study II.

Study II

Although there has been repeated documentation of the facilitation of paired-associate learning resulting from embedding noun pairs within verbal contexts, there have been few attempts to investigate the function of relational characteristics on the ability of an elaboration to facilitate learning. For example, Ehri and Rohwer (1969) evoked a relational explanation to account for the finding that object-related verbs did not facilitate paired-associate learning, while subject-related verbs did. With little supportive data, they hypothesized that an important aspect of elaborational facilitation involves the specification of relations between the noun pairs. Bower (1970) found that subjects instructed to elaborate only upon the stimulus item of a pair, rather than a relationship between the stimulus and response items, showed recall which was no better than that of subjects instructed to repeat the names of the stimulus and response items. Although these studies and others indicate that the formation of relations in an elaboration is important in determining its effectiveness, apparently no direct tests of this hypothesis have been initiated.

The present study was designed to explore the effect of increasing the number of relations in a given syntactic elaboration, and at the same time, to separate this effect from the facilitation previously attributed to the paragraph structure (Turnure, 1971). The indication that physical length is not solely responsible for increasing facilitation (Study I), suggested that the paragraph structure might obtain its

facilitative characteristics from the greater number of relations it may provide rather than from the paragraph structure itself.

Method

Subjects. Seventeen nursery school children were employed as subjects in the present experiment. They were roughly matched for age, and then were assigned to three conditions. Six subjects (3 males, 3 females) were placed in each of the first two groups, and five subjects (2 males, 3 females) in the third. The mean ages were: Group I - 59.2 months (SD=2.1); Group II - 58.8 months (SD=1.9); Group III - 60.0 months (SD=0.7).

Materials. Stimulus materials consisted of 40 colored pictures similar to those used in Study I. From these pictures, one list of 20 pairs was constructed such that there were no obvious or common relations of sound or meaning between the members of a pair. Three types of elaborations were formed. Two were sentences: Sentence-1 consisted of one relation, and Sentence-3 of three relations, between the two items to be associated. The third elaboration form was a paragraph (Paragraph-3) made up from the same three relations used to construct the Sentence-3 elaborations. The elaborations used for each of the 20 pairs are presented in Appendix 2.

A "relation" was defined generally in terms of a separate link, connection, or association between the stimulus and response items. For example, the elaborations for the first pair (Donuts - Box) were determined in the following manner: Sentence-1 formed one association between the donuts and the box (i.e., that the donuts are in the

box). Sentence-3 created three separate links between the donuts and the box: (1) donuts in box; (2) box keeps donuts fresh; (3) box keeps donuts warm. These same three relations were portrayed in the Paragraph-3 condition, but were separated into two sentences. Similarly, for the fourth pair (Shoes - Boat), the one-relation sentence depicted the shoes being thrown at the boat, while the three-relation elaborations depicted the shoes being thrown at the boat, the shoes hitting the boat, and the shoes making the boat sink. The elaborations for all pairs were determined in this manner. There was no restriction on the syntactical characteristics (such as verb type) of the elaborations. The general definition of a relation used here seemed to be adequate for the initial investigation of relational phenomena, especially considering the present lack of unanimity of opinion about such a definition (cf. Ehri & Rohwer, 1969; Milgram, 1967).

Procedure. Each of the three subject groups was assigned to one of the elaboration conditions. Group I was trained with the Sentence-1 elaborations, Group II with the Sentence-3 elaborations, and Group III with the Paragraph-3 elaborations. All subjects were given one training trial. During this trial, the experimenter presented the stimulus and response pictures together for 10 seconds, and at the same time uttered the sentence or paragraph relating the pictures. The subject was not allowed to verbalize the elaboration, but was instructed to listen carefully and then to repeat only the names of the pictures he was shown. These procedures were employed to make the task more difficult (Taylor, Josberger, & Whitely, 1971),

so that differences between conditions would be more likely to emerge.

An acquisition phase, in which the procedures were identical to those used in Study I, followed training. Because of the extended list length, subjects were asked to perform only on one acquisition trial. The number of errors made on this trial was taken as the measure of acquisition performance. No reversal trials were given.

Before initiation of the experiment, it was decided that (a) the performance of subjects in Group I (Sentence-1) would be compared with the mean performance of subjects in Groups II and III (three-relation elaborations), and (b) the performance of subjects in Group II (Sentence-3) would be compared with that of subjects in Group III (Paragraph-3). It seemed that these comparisons would provide measures of the facilitative effects of (a) increasing the number of relations in an elaborative context, and (b) altering the elaboration structure without changing the number of relations in the elaboration.

Results

The mean number of errors made on the 20 pairs in the three groups were: Sentence-1 -- 12.0 (SD=3.6); Sentence-3 -- 7.3 (SD=3.1); Paragraph-3 -- 8.4 (SD=2.5). A planned comparison test of the number of errors made in the one-relation condition (Group I) with the mean number made in the three-relation conditions (Groups II and III) revealed a significant difference (F=6.86; df=1,14; p <.025). The comparison of the numbers of errors made by the Sentence-3 and Paragraph-3 groups was not significant (F<1). Figure 3, which presents

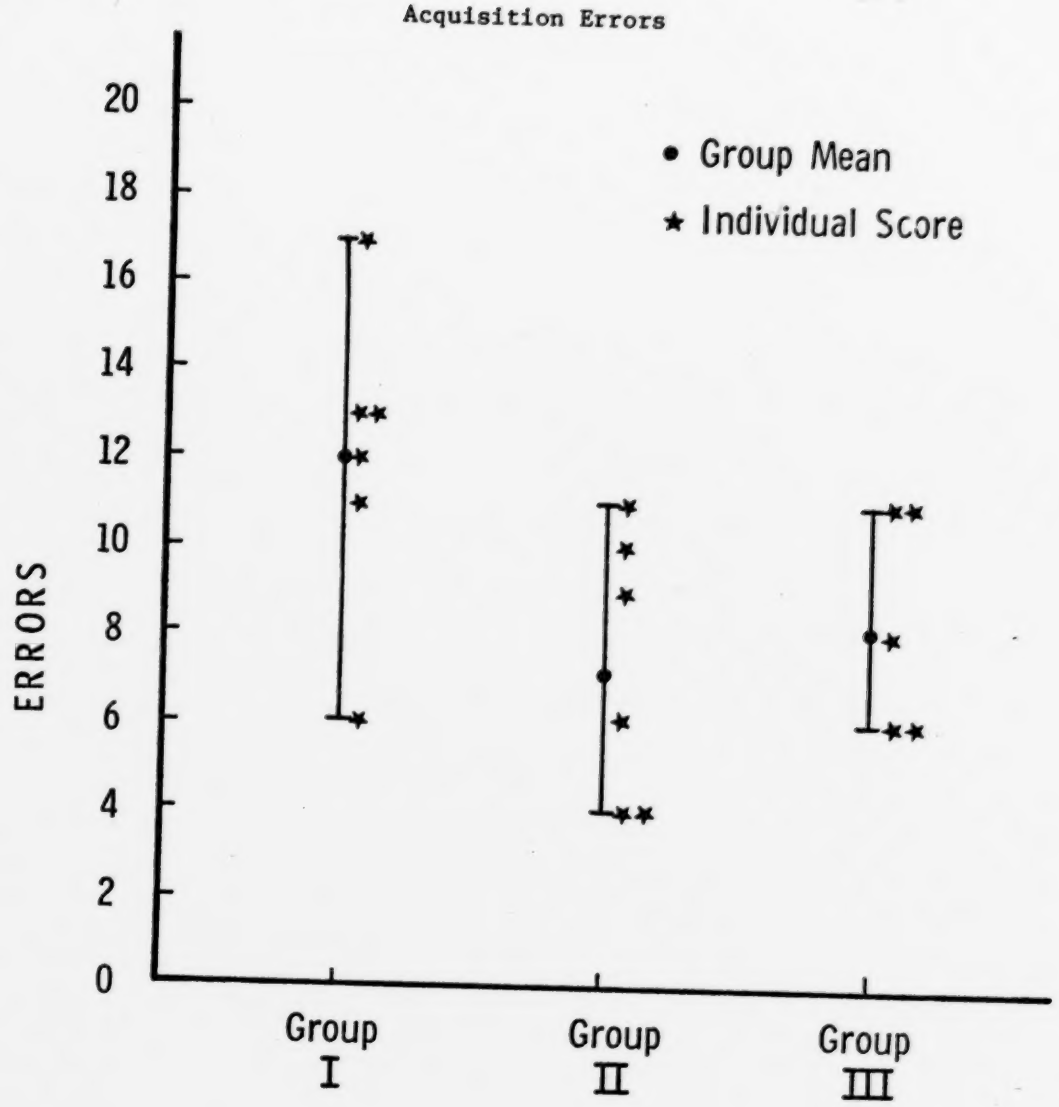
the distribution of error scores in the three groups, reveals that the findings are not limited by a ceiling effect as in Study I. In fact, the differences found in the above analysis were supported by the observation that the proportion of subjects performing at a level of less than 50% errors in the three-relation conditions (7/11=.636) was significantly greater than the proportion of subjects doing so in the one-relation sentence condition (1/6=.167; z=3.17, p <.002). No differences existed between the proportions of subjects responding at this level in Groups II (4/6=.667) and III (3/5=.600; z=.33, n.s.).

As in Study I, it should be noted that the overall greater facilitation found in Groups II and III did not hold true for all pairs. On three pairs, in particular, a smaller proportion of subjects made errors in the Sentence-1 condition than in either of the three-relation conditions (see Appendix 2).

On the assumption that the correlation between the number of subjects erring on each pair would be high for elaboration conditions in which the same factor was affecting performance, correlational analyses were performed on the proportion of subjects making errors on each of the 20 pairs (see Appendix 2) for: (a) the two groups receiving elaborations with a common number of relations (Groups II and III), and (b) the two groups receiving elaborations with a common physical structure (Groups I and II). The first correlation was significant (r=.67; df=18; p <.01); the second was not (r=.30; df=18; p >.10). The correlational analyses thus seemed to provide further support for the notion that common relations were more important in

Figure 3

Acquisition Errors



producing equal facilitation of paired-associate learning than were common physical structures.

Despite the increased task difficulty, the level of paired-associate performance was surprisingly high. Subjects were able to correctly respond to 40, 64, and 58 percent of the 20 pairs in the Sentence-1, Sentence-3, and Paragraph-3 conditions, respectively. This was true despite the attempt to make the task even more difficult by reducing the training intervals to 10 seconds and by preventing overt verbalization of the elaborations.

Discussion

The results of the present investigation suggest that the number of relations contained in an elaboration may be more important than its structure in facilitating performance. It is possible that investigations which have demonstrated the superiority of paragraphs in facilitating paired-associate learning (Turnure, 1971; Turnure & Walsh, 1971; cf. also Thurlow & Turnure, 1971) have employed elaborations which established more relations between the paired items than did the elaboration forms with which they were compared.

The concept of "relations" was defined in a very general way in the present paper. Nonetheless, the particular findings discussed just above demonstrate that such a general definition can produce operationally adequate, manipulable and quantifiable relational terms. Of course, the relational terms employed, and their specific usages, were chosen intuitively, and no further explication of their precise linguistic or psychological status is possible at this time. Other

investigators who have been concerned with problems of the meaning, comprehension or "wholistic representation of the idea communicated" (Franks & Bransford, 1971, p. 11) in their verbal materials have been equally noncommital on the nature of the relations involved in such materials (Bobrow & Bower, 1969; Bransford & Franks, 1971; Franks & Bransford, 1971).

Some other researchers have been slightly more explicit. Blumenthal (1967; Blumenthal & Boakes, 1967) suggests that the psychological organization of sentences depends on the nature of the grammatical relations among sentence parts. This interpretation seems strongly tied to Chomsky's structural linguistic theory, and more specifically, borrows from his formulation of a distinction between the surface structure of a sentence, and its deep structure. Ehri and Rohwer (1969) likewise discuss the work of the transformational grammarians, and refer to the particular significance of the analysis of deep, grammatical relations for an explanation of the results of verbal elaboration research. Ehri and Rohwer (1969) though, also refer approvingly to Fillmore's linguistic analysis of case relations, an analysis which definitely relegates syntax and grammar to a subordinate position in explicating the semantic representations of sentences (cf. Fillmore, 1968). Indeed, Fillmore goes as far as to suggest that "syntactic deep structure is going the way of the phoneme," a view which apparently was in great accord with that of other members of the symposium he was addressing (cf. esp. Bach & Harms, 1968, p. viii; MacCawley, 1968). These recent differences of opinion pertaining to the relation of semantics to syntactics,

as well as to other basically psychological functions (e.g., perception, see Bever, 1970), indicates that a good deal of valuable information may be generated by investigating semantic relationships which are only "intuitively" formulated (see again, Bever, 1970; see also Martin & Olson, 1971; Paivio, 1970), rather than being "derived" from linguistic theory, provided merely that one does not violate the general usage rules comprising the syntactic basis of the verbal formulations provided subjects.

The fact that the difference beteween the Sentence-1 and Sentence-3 groups was significant does not eliminate the possibility that something other than the number of relations between two items may determine the efficacy of any particular elaboration. This suggestion is supported by the observation that the Sentence-3 and Paragraph-3 conditions did not produce performance superior to the Sentence-1 condition for all pairs. It appears that for some pairs, an elaboration containing one relation is more effective than one containing three relations. It may be that the meaning in a small number of cases is clearer when only one relation is provided, or that additional relationships serve to interfere with those already established by the subject.

The attempt of the present study to investigate the characteristics of verbal elaborations which make them effectiave mediators for young children should be discussed with reference to a recent hypothesis proposed by Anderson, Royer, Kulhavy, Thornburg, and Klimt (1971). They suggest that one mediating link is as good as another, as long as the subject "conceives" of it as a link while learning, i.e., he

thinks of or sees a relationship between the stimulus and the response. Thus, they hypothesize that the process of forming a link between two items is more important than the nature of the link itself. They then argue that the search for variables that distinguish effective from ineffective mediators is likely to be less fruitful than the investigation of those variables which influence the kind of processing people give to verbal materials.

If these two types of variables are in fact distinguishable, it still seems that effective and ineffective mediators must first be identified before we can attempt to locate those variables which facilitate the process of "conceiving" a link between two items. This is especially true in young children and mentally retarded individuals, who seem to lack the ability to spontaneously produce effective mediators even though they are able to use mediators provided for them (cf. Flavell, 1970). It would seem that effective mediators would be the ones containing characteristics relevant to the process of forming a link between two items; ineffective mediators, in turn, would contain characteristics which do not aid the process of "conceiving" a link. Only when we can distinguish effective and ineffective mediators would it seem that we can search, with any great precision, for the variables which influence the processing of the mediators.

Perhaps the most striking and pervasive finding of the present studies is the extremely high level of performance shown by subjects provided with syntactic elaboration. In the two studies reported here, subjects were able to respond correctly to an average of over

65.0% of the stimulus items on the first acquisition trial when they had been presented in elaborative contexts. The highest performance levels of the nursery school children ranged from 96% for 12 pairs (Study I) to 64% for 20 pairs (Study II). The superiority of these performance levels to those typically obtained by children given only labels for the stimulus-response items is obvious. With 12 pairs, Rohwer and Levin (1968) found that 5th grade children (who were approximately 5 years older than the children given the 12-pair list in Study I) responded correctly to 34.3% of the items on the first trial, a level considerably lower than that obtained by the young children in Study I. In comparison with the performance of the children in Study II, the performance of children 5 years older in a somewhat simpler task (14 pairs; Rohwer, Shuell, & Levin, 1967), still did not obtain such a high level (31.7% versus 64.0%). Even with a recognition task, Davidson and Dollinger (1969) found that control subjects were able to correctly recognize an average of only 2.63 of 20 pairs (13.2%) on the first trial.

The outstanding performance reported here is consistent with that found previously with both normal and retarded children. Figure 4 presents the findings of two studies (Turnure, et al., 1971, Studies I & III) on the effects of elaboration on the paired-associate learning of normal children in a four-pair list. These data tentatively indicate a developmental function relating age and performance level, at least between the ages of three and seven. Figure 5 presents somewhat comparable data for various MA level retardates, in a list of

Figure 4

Performance of Normal Children in 4-Pair Verbal Elaboration Studies

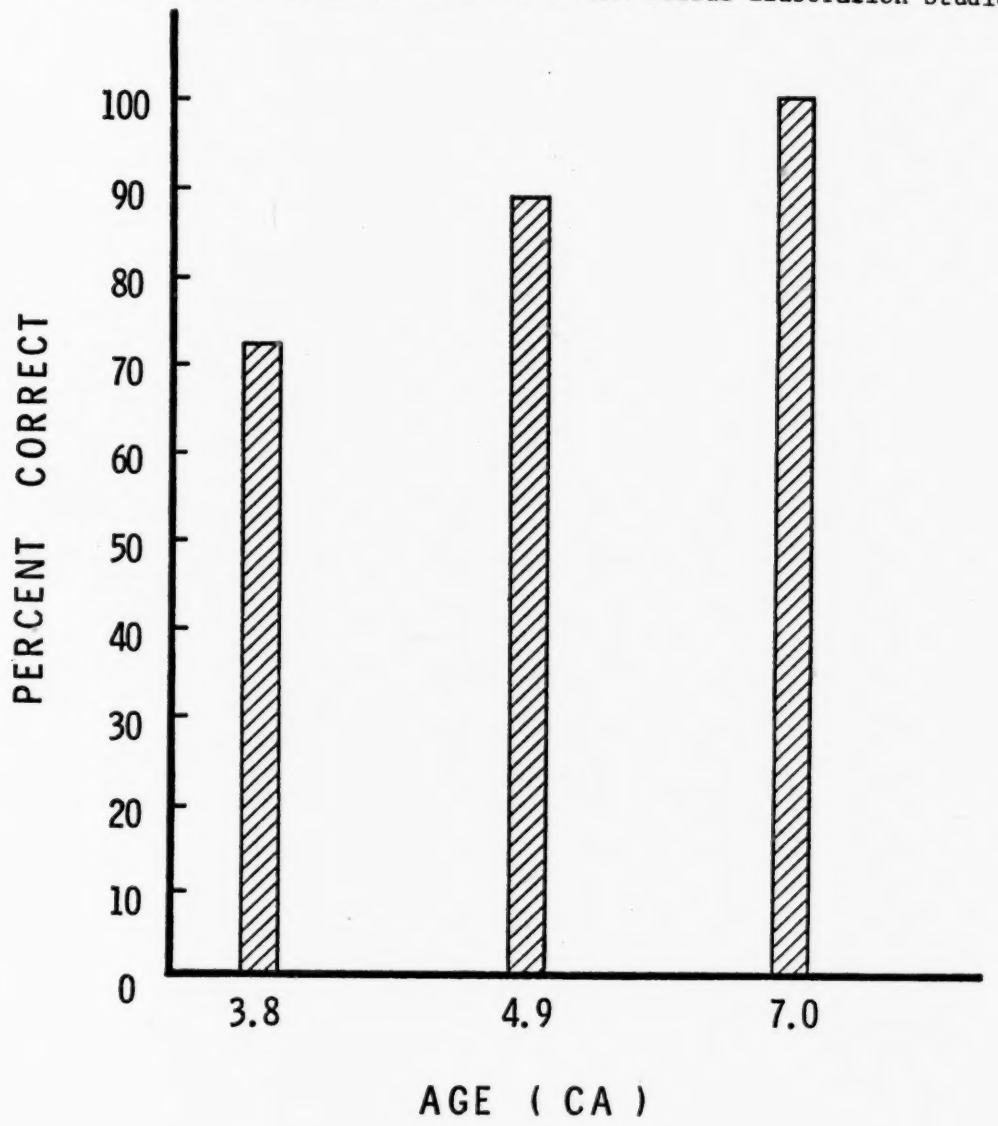
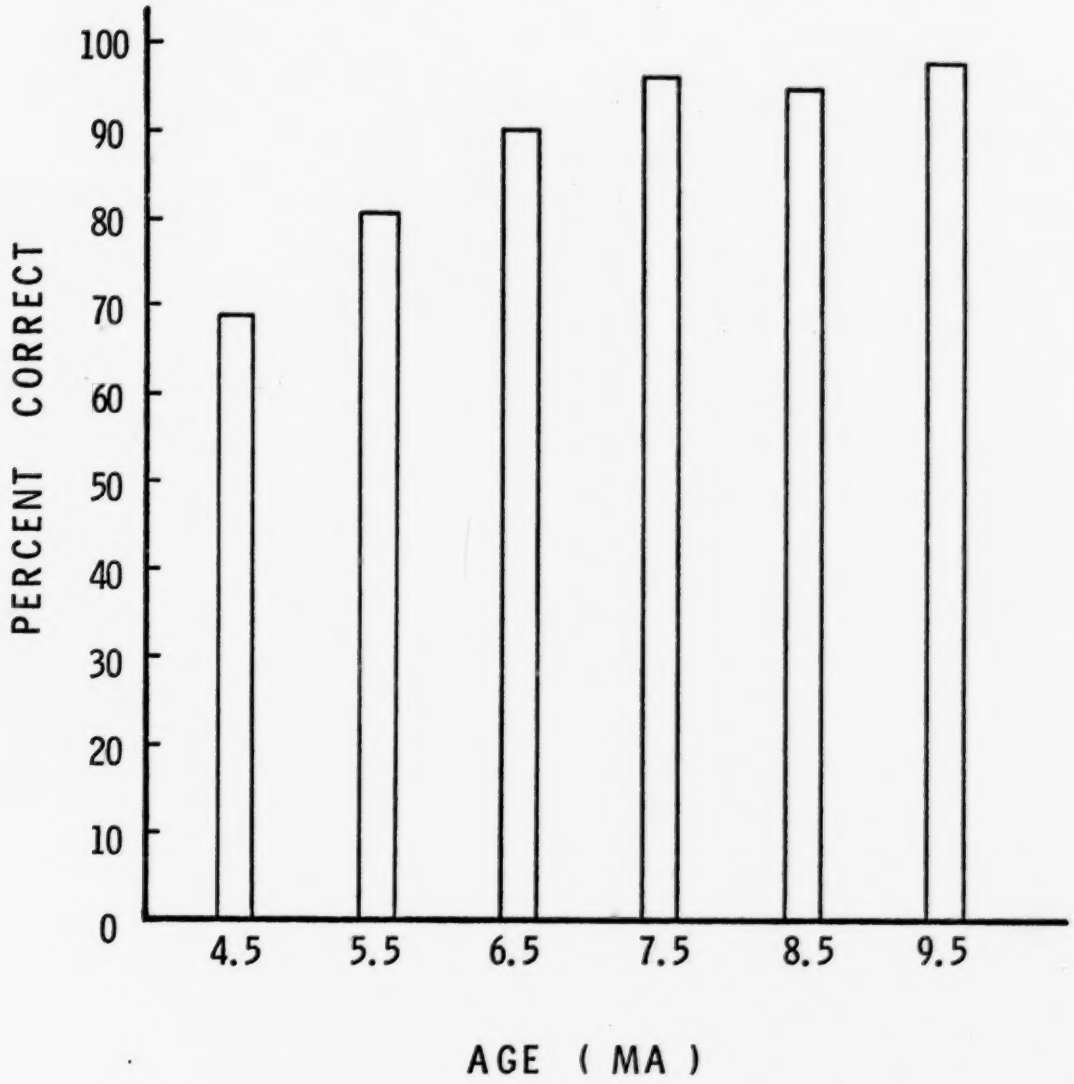


Figure 5

Performance of Retarded Children in 6-Pair Verbal Elaboration Studies



six pairs (Turnure, Larsen, & Thurlow, 1971, Study I). Again, the implication is that between the mental ages of four and seven, there is a regular developmental function. The apparent leveling of performance after seven years MA seems to reflect a ceiling effect on performance in the relatively short 6-pair list.

The performances of normals and retardates at various list lengths are presented in Figures 6 and 7, respectively. Although the data presented in these figures have been taken from a large number of subjects and represent different ages and somewhat different elaboration conditions, the results, in general, can be used to propose certain performance trends. It appears that list length has little effect on performance except at the longer lengths, where there is a definite drop in the percentage of pairs correctly recalled. This drop seems to occur somewhere after the 12-pair list for normals and after the 8-pair list for retardates.

Zigler (1966) has suggested that the familial retardate progresses from one intellectual stage to the next in the same sequence as is encountered in other children. The present data, although not gathered as specific tests of Zigler's hypothesis, do indicate that the performance of normal and retarded children demonstrate considerable similarity in elaboration paired-associate learning tasks. Both normal and retarded children seem to show a developmental function, with younger CA normals and younger MA retardates performing worse than older ones. Furthermore, both groups of children seem to perform at a level of 80 to 90 percent correct up to a certain list length, at which point they both drop to a level of 60 to 70%, one which is still impressively high.

Figure 6

Performances of Normal Children at Various List Lengths

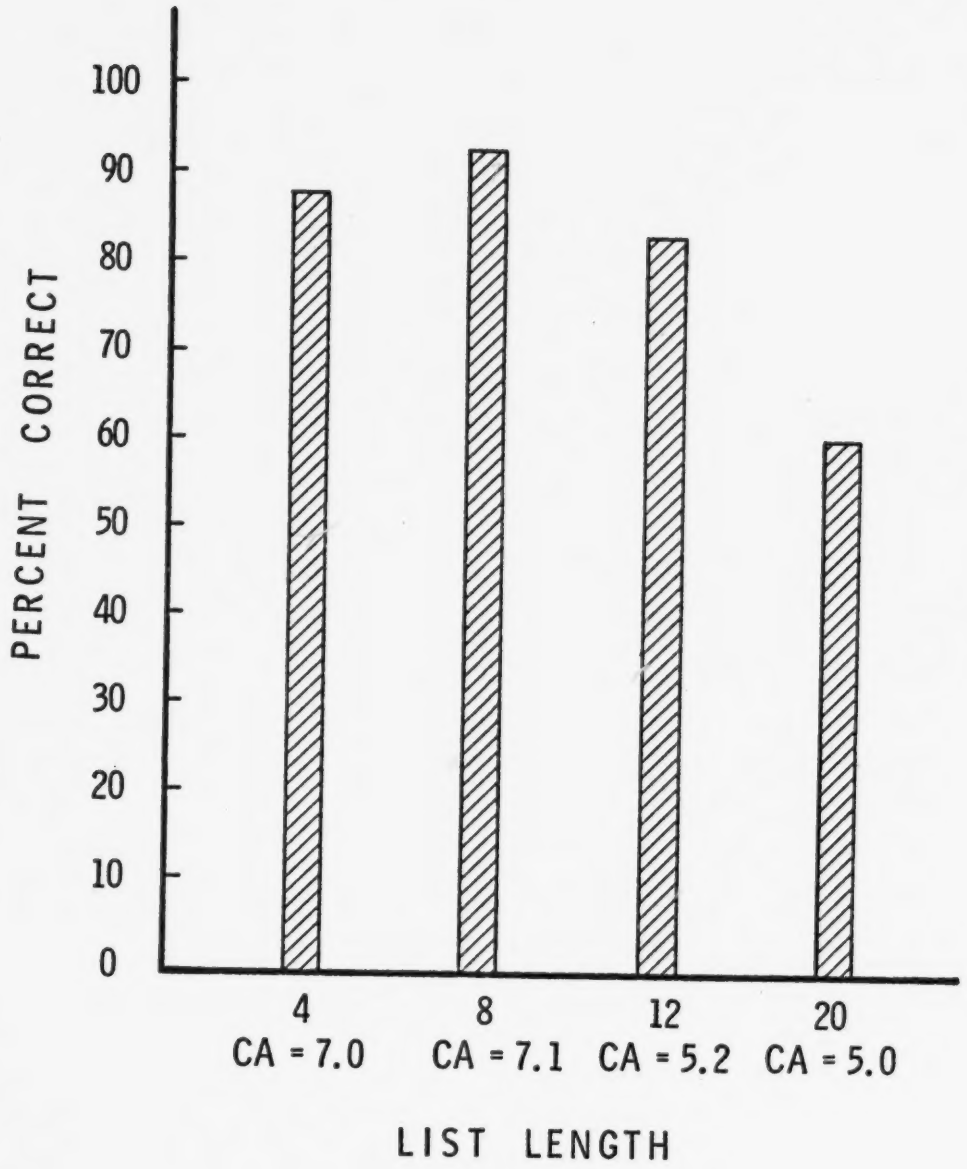
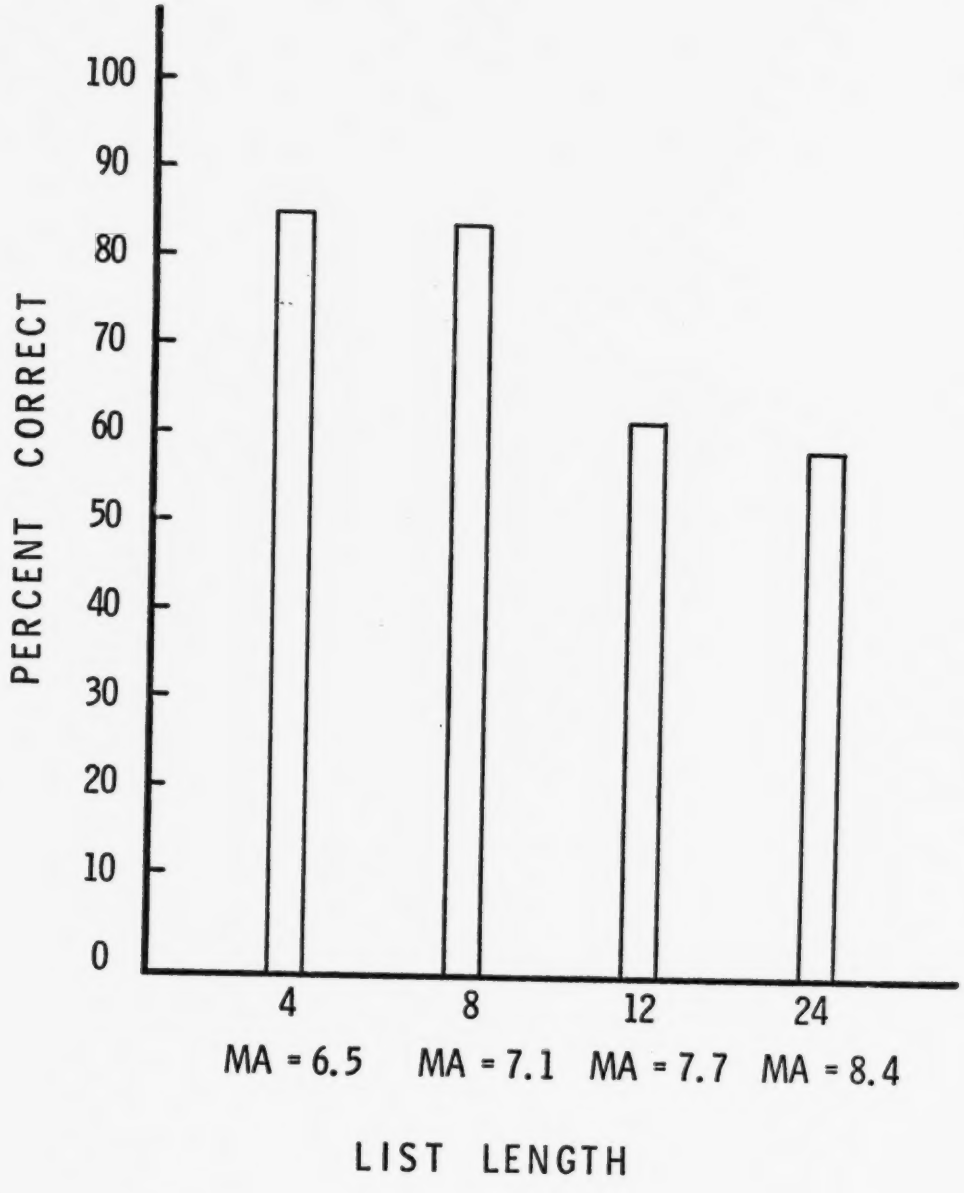


Figure 7

Performances of Retarded Children at Various List Lengths



These indications seem to be firmly supported by the data despite the variation in subject and experimental characteristics within and across the various list lengths.

It would seem reasonable to suggest that mediational processes in normal and retarded children are comparable, although the retarded child has tended to be slower in reaching a given level of achievement than his normal peer. Furthermore, it seems that characteristics which enhance the mediational efficacy of verbal elaborations for normal children should be equally effective in enhancing their efficacy for retarded children. It thus appears that the goal of identifying the elaborational characteristics of those communications most effectively received and used in learning tasks by young retarded children can initially be approached by identifying, and then implementing, those characteristics which have been found to be beneficial to the mediational processes of normal individuals. The availability of large numbers of young, "normal," subjects with whom we may test the effectiveness of various elaborated communications, as well as with whom we may investigate the nature of the process of how elaborated material is utilized, can thus be seen as a rich resource for enhancement of learning in mentally retarded children. Clarification of the processes of "learning" in young children is surely the major requirement for substantial advance in ameliorating the retarded intellectual development of retarded children.

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Footnote

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Appendix 1

Stimulus-Response Pairs, Their Verbal Elaborations, and the Percentages of Subjects Erring on Each Pair

Study I

1. Pencil - Hammer

   a. 2-Sentence: He wanted to break something. That's why he hit the pencil with the hammer. (0.0%)

   b. 3-Sentence: He was mad yesterday. He wanted to break something. That's why he hit the pencil with the hammer. (9.1%)

2. Shovel - Comb

   a. 2-Sentence: They found something in his shovel. It was a comb. (54.4%)

   b. 3-Sentence: They were digging. They found something in his shovel. It was a comb. (27.3%)

3. Doll - Tent

   a. 2-Sentence: The doll is walking to the tent. She is going to sleep there. (18.2%)

   b. 3-Sentence: Something is moving over there. It is a doll walking to the tent. She is going to sleep there. (0.0%)

4. Cat - Box

   a. 2-Sentence: The cat wants to play. Let's give him the box. (36.4%)

   b. 3-Sentence: The cat wants to play. He wants a nice toy. Let's give him the box. (18.2%)

5. Sun - Pie

   a. 2-Sentence: The sun is shining on the pie. It will get warm. (18.2%)

   b. 3-Sentence: The sun is shining on the pie. It will get warm. Then we can eat it. (9.1%)

6. Gate - Carrots

   a. 2-Sentence: Something is growing by the gate. It is carrots. (0.0%)

   b. 3-Sentence: Something is growing by the gate. It is carrots. She is going to pick one. (0.0%)

7. Wagon - Leaf

   a. 2-Sentence: It was windy yesterday. Now the wagon has a leaf in it. (9.1%)
   b. 3-Sentence: He left his things by the tree. It was windy yesterday. Now the wagon has a leaf in it. (9.1%)

8. Jacket - Donuts

   a. 2-Sentence: He put some things in his jacket. They are donuts. (9.1%)
   b. 3-Sentence: His mother gave him some things to eat. He put them in his jacket. They are donuts. (0.0%)

9. Wheel - Barn

   a. 2-Sentence: There is a wheel in the barn. He can play with that. (9.1%)
   b. 3-Sentence: Bring him some things to play with. There is a wheel in the barn. He can play with that too. (27.3%)

10. Ball - Table

   a. 2-Sentence: Don't bounce the ball. Put it on the table. (18.2%)
   b. 3-Sentence: Don't bounce the ball. It might break something. Put it on the table. (18.2%)

11. Telephone - Window

   a. 2-Sentence: The telephone is by the window. It is ringing. (36.4%)
   b. 3-Sentence: The telephone is by the window. It is ringing. She will answer it. (9.1%)

12. Hat - Lamp

   a. 2-Sentence: The hat is in a strange place. It is on the lamp. (36.4%)
   b. 3-Sentence: The hat is in a strange place. It is on the lamp. He doesn't want to wear it. (0.0%)

Appendix 2

Stimulus-Response Pairs, Their Verbal Elaborations, and the Percentages of Subjects Erring on Each Pair

Study II

1. Donuts - Box

   a. Sentence-1: The donuts are in the box. (33.3%)
   b. Sentence-3: The donuts are in the box because it keeps them fresh and warm. (0.0%)
   c. Paragraph-3: The donuts are in the box. It keeps them fresh and warm (60.0%)

2. Cat - Gate

   a. Sentence-1: The cat ran up to the gate.(66.7%)
   b. Sentence-3: The cat ran up to the gate, looked at it, and then jumped over it. (33.3%)
   c. Paragraph-3: The cat ran up to the gate. He looked at it and then jumped over it. (20.0%)

3. Comb - Book

   a. Sentence-1: He put the comb in his book. (83.3%)
   b. Sentence-3: He put the comb in his book so it would keep his place, but it fell out. (100.0%)
   c. Paragraph-3: He put the comb in his book. He wanted it to keep his place, but it fell out. (100.0%)

4. Shoes - Boat

   a. Sentence-1: He threw his shoes at the boat. (33.3%)
   b. Sentence-3: When he threw his shoes at the boat, they hit it and made it sink. (66.7%)
   c. Paragraph-3: He threw his shoes at the boat. They hit it and made it sink. (100.0%)

5. Hat - Tent

   a. Sentence-1: The hat blew around the tent. (83.3%)
   b. Sentence-3: The hat blew around the tent, hit its top, and then landed beside it. (50.0%)
   c. Paragraph-3: The hat blew around the tent. It hit its top and then landed beside it. (40.0%)

6. Pig - Key

   a. Sentence-1: The pig saw the key. (66.7%)
   b. Sentence-3: When the pig saw the key, he sniffed at it, and then tried to eat it. (83.3%)
   c. Paragraph-3: The pig saw the key. He sniffed at it and then tried to eat it. (100.0%)

7. Dog - Kite

   a. Sentence-1: The dog barked at the kite. (83.3%)
   b. Sentence-3: The dog barked at the kite and then ran after it and caught it. (50.0%)
   c. Paragraph-3: The dog barked at the kite. Then he ran after it and caught it. (100.0%)

8. Fish - Cup

   a. Sentence-1: They put the fish in the cup. (66.7%)
   b. Sentence-3: They put the fish in the cup so he could swim there, but it wasn't big enough for him. (33.3%)
   c. Paragraph-3: They put the fish in the cup. They thought he could swim there, but it wasn't big enough. (20.0%)

9. Wheel - Pencil

   a. Sentence-1: The wheel rolled across the pencil. (100.0%)
   b. Sentence-3: The wheel rolled across the pencil, broke it, and then got it all dirty. (16.7%)
   c. Paragraph-3: The wheel rolled across the pencil. It broke it and got it all dirty. (40.0%)

10. Ball - Table

   a. Sentence-1: He put the ball on the table. (83.3%)
   b. Sentence-3: He put the ball on the table, but when it rolled off, he put it under it. (33.3%)
   c. Paragraph-3: He put the ball on the table. When it rolled off, he put it under it. (80.0%)

11. Carrots - Pie

   a. Sentence-1: She put carrots in the pie. (83.3%)
   b. Sentence-3: She put carrots in the pie and they made it look and taste funny. (66.7%)
   c. Paragraph-3: She put carrots in the pie. They made it look and taste funny. (50.0%)

12. Milk - Chair

a. Sentence-1: The milk spilled on the chair. (0.0%)
b. Sentence-3: The milk spilled on the chair, turned it white, and made it all wet. (16.7%)
c. Paragraph-3: The milk spilled on the chair. It turned it white and made it all wet. (0.0%)

13. Turtle - Basket

a. Sentence-1: The turtle crawled into the basket. (100.0%)
b. Sentence-3: The turtle crawled into the basket so he could sleep there, but then he couldn't get out. (33.3%)
c. Paragraph-3: The turtle crawled into the basket. He slept there and then he couldn't get out. (16.7%)

14. Shovel - Barn

a. Sentence-1: He took the shovel to the barn. (50.0%)
b. Sentence-3: He took the shovel to the barn so he could use it there and then leave it there. (16.7%)
c. Paragraph-3: He took the shovel to the barn. He used it there and then left it there. (40.0%)

15. Doll - Wagon

a. Sentence-1: Put the doll in the wagon. (33.3%)
b. Sentence-3: Put the doll in the wagon so she can sit there and take a ride. (16.7%)
c. Paragraph-3: Put the doll in the wagon. She can sit there and take a ride. (20.0%)

16. Socks - Sun

a. Sentence-1: Hang your socks out in the sun. (33.3%)
b. Sentence-3: Hang your socks out in the sun and it will make them dry and warm. (50.0%)
c. Paragraph-3: Hang your socks in the sun. It will make them dry and warm. (0.0%)

17. Leaf - Toaster

a. Sentence-1: They put the leaf in the toaster. (33.3%)
b. Sentence-3: When they put the leaf in the toaster, it burned it and made it turn brown. (16.7%)
c. Paragraph-3: They put the leaf in the toaster. It burned it and made it turn brown. (0.0%)

18. Duck - Window

a. Sentence-1: The duck walked up to the window. (83.3%)
b. Sentence-3: The duck walked up to the window, looked through it, and knocked on it with his beak. (16.7%)
c. Paragraph-3: The duck walked up to the window. He looked through it and knocked on it with his beak.(20.0%)

19. Monkey - Hammer

a. Sentence-1: The monkey grabbed the hammer. (83.3%)
b. Sentence-3: The monkey grabbed the hammer, hit himself with it and then threw it away. (16.7%)
c. Paragraph-3: The monkey grabbed the hammer. He hit himself with it and then threw it away. (20.0%)

20. Boots - Bed

a. Sentence-1: He put the boots on the bed. (0.0%)
b. Sentence-3: He put the boots on the bed, but when they got it dirty, he took them off of it. (16.7%)
c. Paragraph-3: He put the boots on the bed. When they got it dirty, he took them off of it. (0.0%)